



## 2019-nCoV Literature Situation Report (Lit Rep)

May 5, 2020

The scientific literature on COVID-19 is rapidly evolving and these articles were selected for review based on their relevance to Washington State decision making around COVID-19 response efforts. Included in these Lit Reps are some manuscripts that have been made available online as pre-prints but have not yet undergone peer review. Please be aware of this when reviewing articles included in the Lit Reps.

### Key Takeaways

- **Modeling studies that examined national and local (King County) COVID-19 epidemics found that relaxation of social distancing strategies prior to June 2020 could trigger a second wave of infections.**
- **Modeling suggests that use of face masks in public (even low-efficacy cloth masks) can significantly reduce COVID-19 cases, and that use of face masks with efficacy  $\geq 70\%$  (e.g. surgical masks) could lead to the elimination of the pandemic if at least 80% of the U.S. residents use them consistently while in public.**
- **Ethanol can be used to sanitize FFP2 masks, and ultraviolet-C light and aerosolized peracetic acid and hydrogen peroxide can reduce contamination on N95 respirator masks.**
- **Temperature and humidity were both inversely associated with daily new cases and deaths in an analysis of 166 countries, suggesting that the COVID-19 pandemic may be partially suppressed as temperature and humidity increases.**

### Non-Pharmaceutical Interventions

- The effect of ethanol on the filtering properties of FFP2 masks was tested. The filtering properties of a mask are related to the size and tortuosity of the pores of the filter and are quantified by its permeability; damage to the filter will change its permeability. After six cleaning cycles, the permeability remains very close to the permeability before cleaning, suggesting that ethanol could be used to sanitize a FFP2 mask without significantly altering its filtering properties.

*Lenormand. (May 5a, 2020). Effect of Ethanol Cleaning on the Permeability of FFP2 Mask.*

*Preprint downloaded May 5 from Medrxiv. <https://doi.org/10.1101/2020.04.28.20083840>*

- Cadnum et al. compared three decontamination methods for use on N95 respirator masks (n=3). A high-level disinfection cabinet that generates aerosolized peracetic acid and hydrogen peroxide achieved disinfection with a 31-minute cycle. Ultraviolet-C light reduced contamination but did not meet pre-defined criteria for decontamination of the viruses (6 log<sub>10</sub> reductions). Dry heat at 70° C for 30 minutes was not effective for decontamination.

*Cadnum et al. (May 2, 2020). Effectiveness of Ultraviolet-C Light and a High-Level Disinfection Cabinet for Decontamination of N95 Respirators. Pathogens & Immunity.*

*<https://doi.org/10.20411/pai.v5i1.372>*

- Using parameters derived from literature, Barr describes a model to estimate the relative risk of aerosol from normal breathing in a variety of settings. The model indicates a multiplicative benefit of using cloth masks by both infected and uninfected individuals in three settings (car, small non-ventilated room, larger ventilated space). The model found that social distancing at 2 meters is effective but its benefit is time limited in confined areas. Use of masks by both infected and uninfected individuals in the absence of extremely good ventilation was effective.

*Barr. (May 5, 2020). A Simple Model to Show the Relative Risk of Viral Aerosol Infection and the Benefit of Wearing Masks in Different Settings with Implications for Covid-19. Preprint downloaded May 5 from Medrxiv. <https://doi.org/10.1101/2020.04.28.20082990>*

## Transmission

- Rosa et al. conduct a literature review and identify 12 studies of Coronaviruses (CoV) in water environments and evaluated implications for human health. Included studies suggest that: 1) CoV seems to have a low stability in water and is very sensitive to oxidants like chlorine; 2) CoV appears to be inactivated significantly faster in water than non-enveloped human enteric viruses with known waterborne transmission; 3) temperature is an important factor influencing viral survival (the titer of infectious virus declines more rapidly at 23°C or 25°C than at 4° C); 4) there is no current evidence that human coronaviruses are present in surface or ground waters or are transmitted through contaminated drinking water; 5) further research is needed to adapt the methods commonly used to sample and concentrate enteric, non-enveloped viruses from water environments so that they can be applied to enveloped viruses.

*Rosa et al. (April 28, 2020). Coronavirus in Water Environments: Occurrence, Persistence and Concentration Methods - A Scoping Review. Water Research. <https://doi.org/10.1016/j.watres.2020.115899>*

## Geographic Spread

- Wu et al. apply a statistical model to investigate temperature and relative humidity as predictors of new COVID-19 cases and deaths in 166 countries (excluding China) through March 27, 2020. They control for wind speed, median age of the national population, Global Health Security Index, Human Development Index, and population density as potential confounders.
- Temperature and relative humidity were both inversely associated with new cases and deaths. These findings provide preliminary evidence that the COVID-19 pandemic may be partially suppressed as temperature and humidity increase. However, during the study period, settings where temperatures were rising overlapped with settings where epidemics were waning, either naturally or in response to public health measures.

*Wu et al. (April 28, 2020). Effects of Temperature and Humidity on the Daily New Cases and New Deaths of COVID-19 in 166 Countries. The Science of the Total Environment. <https://doi.org/10.1016/j.scitotenv.2020.139051>*

## Testing and Treatment

- Hoffman et al. evaluated a commercially available test developed for rapid (<15 minutes) detection of SARS-CoV-2 antibodies – the COVID-19 IgG/IgM Rapid Test Cassette. Among 19 RT-PCR confirmed COVID-19 cases and 124 negative controls, the authors estimated the assay to have 69% and 93.1% sensitivity for IgM and IgG, respectively. The assay specificities were 100% and 99.2%, respectively. These study results suggest that this serological test is suitable for assessing previous virus exposure,

but that negative results may be unreliable during the first weeks after infection due to lower assay sensitivity for IgM antibodies.

Hoffman et al. (April 14, 2020). *Evaluation of a COVID-19 IgM and IgG Rapid Test; an Efficient Tool for Assessment of Past Exposure to SARS-CoV-2*. *Infection Ecology & Epidemiology*.

<https://doi.org/10.1080/20008686.2020.1754538>

### Clinical Characteristics and Health Care Setting

- An analysis of 3,272 persons with COVID-19 who required hospitalization at Mount Sinai Health System in New York found that age, body-mass index (BMI), baseline oxygen saturation, respiratory rate, white blood cell count, creatinine, and alanine aminotransferase were significant predictors of mortality. Asthma was associated with increased length of hospital stay, but not mortality.
- Among patients who were tested for SARS-CoV-2, a higher proportion of Hispanic and African American patients tested positive (29% and 25%, respectively) compared to the overall patient population (22%, 6158/28,336). While race was associated with the prevalence of infection among patients, the authors did not observe racial disparities in inpatient mortality.

Wang et al. (May 4, 2020). *Analysis of Hospitalized COVID-19 Patients in the Mount Sinai Health System Using Electronic Medical Records (EMR) Reveals Important Prognostic Factors for Improved Clinical Outcomes*. Preprint downloaded May 5 from Medrxiv.

<https://doi.org/10.1101/2020.04.28.20075788>

- This retrospective analysis of clinical characteristics of children diagnosed with COVID-19 (n=16, age 11 months to 14 years) found that no children experienced severe illness. Most cases (12/16) were exposure to a family member with COVID-19. Among asymptomatic children (8/16), the median time from exposure via family member to first positive SARS-CoV-2 nucleic acid test (NAT) result was 15.5 days (range, 10–26 days; the median time to first negative NAT result was 5.5 days (range, 1–23 days).

Song et al. (April 16, 2020). *Clinical Features of Pediatric Patients with Coronavirus Disease (COVID-19)*. *Journal of Clinical Virology*. <https://doi.org/10.1016/j.jcv.2020.104377>

### Modeling and Prediction

- An agent-based simulation (FRED - Framework for Reconstructing Epidemic Dynamics) was used to model the incidence of COVID-19 in King County, WA in a variety of scenarios including case isolation at home, school closure, and social distancing. While non-pharmaceutical interventions (NPIs) were effective in flattening the curve, any relaxation of social distancing strategies yielded a second wave. Even if daily confirmed cases dropped to one digit, daily incidence can peak again to 874 cases in the absence of imported cases.

Lee. (May 4, 2020). *COVID-19 Pandemic Response Simulation Impact of Non-Pharmaceutical Interventions on Ending Lockdowns*. Preprint downloaded May 5 from Medrxiv.

<https://doi.org/10.1101/2020.04.28.20080838>

- Ngonghala et al. predict that use of face masks with efficacy  $\geq 70\%$  (e.g. surgical masks) could lead to the elimination of the pandemic if at least 80% of the U.S. residents use such masks in public consistently. The use of lower-efficacy masks (e.g. cloth masks with  $<30\%$  efficacy) could still lead to significant reduction of COVID-19 cases, but would not lead to elimination. The best model scenarios reduced cases by 64% only if the strict social distancing measures were maintained until the end of

May or June 2020. This study shows that early termination of the strict social distancing measures could trigger a second wave of COVID-19 cases.

*Ngonghala et al. (May 1, 2020). Mathematical Assessment of the Impact of Non-Pharmaceutical Interventions on Curtailing the 2019 Novel Coronavirus. Mathematical Biosciences.*

<https://doi.org/10.1016/j.mbs.2020.108364>

#### Other Resources and Commentaries

- [COVID-19 Immunity Passports and Vaccination Certificates: Scientific, Equitable, and Legal Challenges](#) – The Lancet (May 4)
- [COVID-19, Superinfections and Antimicrobial Development: What Can We Expect?](#) – Clinical Infectious Diseases (May 1)
- [The COVID-19 Pandemic Illuminates Persistent and Emerging Disparities among Rural Black Populations](#) – The Journal of Rural Health (May 3)
- [Mobile phones represent a pathway for microbial transmission: A scoping review](#) – Travel Medicine and Infectious Disease (April 24)
- [Putting Some Context to the Aerosolization Debate around SARS-CoV-2](#) – The Journal of Hospital Infection (April 24)
- [Do the Current Cases Reported to the WHO Provide a Realistic Incidence Rate of Countries Infected with COVID-19?](#) – Infection Ecology & Epidemiology (April 10)
- [Comparative Seasonalities of Influenza A, B and “common Cold” Coronaviruses - Setting the Scene for SARSCoV-2 Infections and Possible Unexpected Host Immune Interactions](#) – The Journal of Infection (April 22)

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